8086

Telephony Training Systems

LabVolt Series

Datasheet

Festo Didactic
en 120 V - 60 Hz
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General Description

The Telephony Training Systems are powerful learning tools that allow students to become familiar with the operation of modern telephone networks and digital private automatic branch exchanges (PABX). The training systems are also essential tools to introduce students to the Integrated Services Digital Network (ISDN).

The Telephony Training Systems are built upon the Reconfigurable Training Module, Model 9431. This module, which uses state-of-the-art digital signal processor (DSP) technology, can be programmed to act as different parts of a telephone network.

The courseware included with the training systems consists of a series of five student manuals, an instructor guide for each student manual, and a user guide.

Interface cards that students install in the training module allow connection of real analog and digital telephone sets and trunk lines. A central office (CO) is easily implemented by inserting an analog line interface card into a training module programmed to act as a central office. Similarly, a digital PABX is implemented by inserting a digital telephone interface card into a training module programmed to act as a PABX.

Furthermore, a simple telephone network can be set up quickly by adding analog and digital trunk interface cards to two COs and a PABX implemented with three training modules, and interconnecting the modules with trunk lines. Such a telephone network allows establishment of both intra- and inter-exchange calls as well as tandem-switched calls.

A Pentium-type host computer (not included), connected to the Reconfigurable Training Module through a high-speed data link (Ethernet link with TCP/IP protocol), is required to run the Telephony Training System (LVTTS) software. This Windows®-based software is used to download programs into the DSP memory of the Reconfigurable Training Module. The LVTTS software also has an intuitive user interface to:

- display the functional block diagram of the telephony equipment (CO, digital PABX, etc.) implemented in the Reconfigurable Training Module
- change various system settings and options, such as the telephone ringing cadence, companding type, subscriber names and phone numbers, etc.
- observe real signals throughout the system in both the time and frequency domains using modern virtual instruments;
- perform step-by-step observation of call routing sequences by recording all the events that occur during a call and then playing back these events
- insert faults in the system (password-protected feature) for troubleshooting purposes

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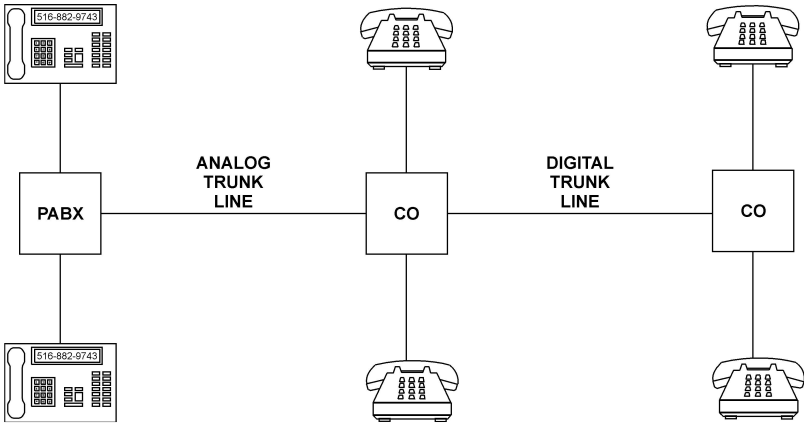
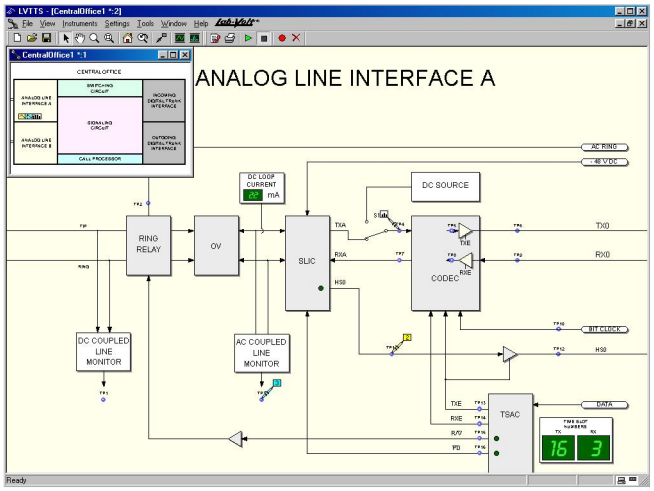
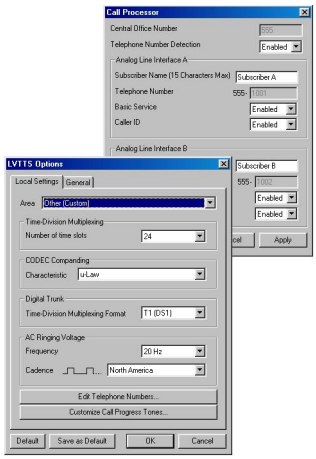


Example of a simple telephone network.



Part of the functional block diagram of a CO as observed in the LVTTS software.



System settings and options are configured through windows in the LVTTS software.

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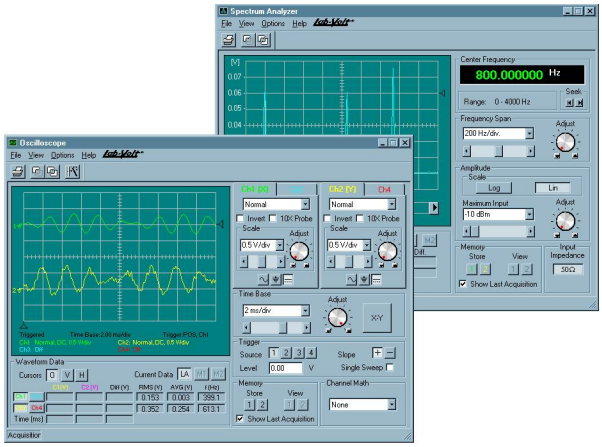
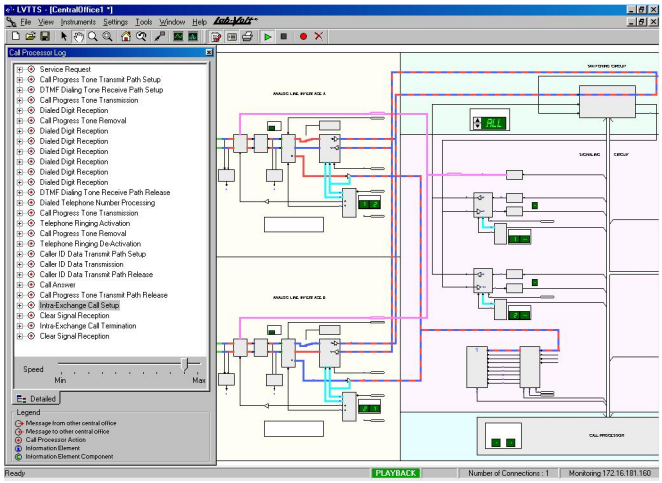


Real signals can be observed in both the time and frequency domains using virtual instruments included with the LVTTS software.



The Call Processor Log in the LVTTS software allows all events that occur during a call to be recorded. These events can then be played back sequentially to display what happens in the system (CO or PABX) when a call is established and terminated.

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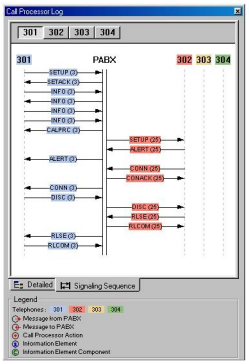
Each student manual covers one particular subject and is divided into several units. Each unit consists of a series of hands-on exercises dealing with certain aspects of telephony. The exercises contain a clearly stated objective, a discussion, a summary of the exercise procedure, a detailed exercise procedure, a conclusion, and a set of review questions. A ten-question test at the end of each unit allows the instructor to verify the knowledge gained by the student. Each instructor guide provides the measured results as well as the answers to all questions of each exercise in the corresponding student manual. It also provides the answers to the unit test questions. The user guide provides all the information required to set up and use the Telephony Training System. Refer to the section of this datasheet titled Table of Contents of the Student Manuals for the topics covered in each student manual.

The basic TTS, Model 8086-1, contains all the equipment and courseware material required to cover the first two of the five fields of telephony mentioned above, that is, Analog Access to the Telephone Network and Central Office Operation. Other sets of equipment can be added to the basic TTS as required to cover the remaining fields mentioned above, that is, Digital PABX, PABX Analog Trunk, and Digital Trunk. Refer to the lists of equipment provided in this data sheet for additional information.

The Telephony Training System is also an essential tool to introduce students to the Integrated Services Digital Network (ISDN). This is due to the fact that the digital PABX which can be setup with the TTS uses digital telephone sets of the ISDN type and ISDN basic rate interfaces. Furthermore, the digital trunk that can be set up to interconnect two CO's implemented with the TTS uses ISDN primary rate interfaces. Thus, while performing the courseware material for the digital PABX and the digital trunk, students are introduced to the following two major aspects of ISDN: the physical layer (layer 1) and the network layer (layer 3). Layer 1 defines the physical support and the nature of the electrical signals used in ISDN interfaces. Layer 3 defines the digital signaling protocol used in the ISDN to establish and release connections (telephone calls). A powerful data-logging instrument in the LVTTS software, referred to as the Call Processor Log, allows recording of all ISDN layer-3 messages that are exchanged between ISDN entities (call processor in a CO or PABX, digital telephone sets) during telephone calls. This enables student to easily observe the sequence of ISDN layer-3 messages that are used to establish a call, place a call on hold, initiate a conference call, terminate a call, etc. The Call Processor Log can also display the detailed contents of the ISDN layer-3 messages recorded, thereby allowing thorough investigation of the ISDN signaling protocol.



The Call Processor Log in the LVTTS software can display ping-pong type diagrams that illustrate sequences of ISDN layer-3 messages exchanged during telephone calls.

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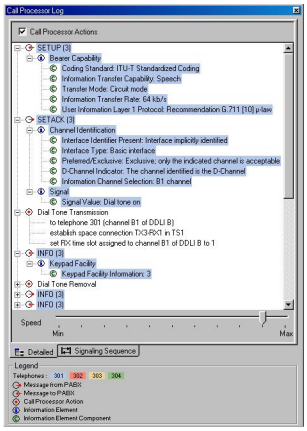

The Call Processor Log in the LVTTS software can display the detailed contents of the ISDN layer-3 messages recorded, down to the information element (IE) components.

Topic Coverage

- Analog Access to the Telephone Network
- Central Office Operation
- Digital PABX
- PABX Analog Trunk
- Digital Trunk

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Features & Benefits

- Software simulation flexibility provides for real-life, stimulating exercicses
- DSP-based reconfigurable training system easily upgradable to emerging new standards and systems
- System can be configured for different international standards
- When configured as a digital PABX or when a digital trunk is set up, system allows study of the physical and network layers
- Powerful and innovative system for studying modern telephone networks
- Can be configured as a digital CO of the public switched telephone network (PSTN) or as a digital PABX
- Add-on packages allows for a comprehensive training system
- Comprehensive curriculum
- Fault-insertion capabaility for troubleshooting purposes
- Minimal hardware interfaces are required
- Enhanced flexibility through the elimination of front panel controls and diagrams
- Software allows display of diagrams, signal observation, settings changes, etc.
- Estimated total program (including all add-ons): 100 hours

List of Available Training Systems

Qty	Description	Model number
1	Telephony Training System - Analog Telephone	8086-10
1	Telephony Training System - Digital Telephone Add-On	8086-20
1	Telephony Training System - Analog Trunk Add-On	8086-30
1	Telephony Training System - Digital Trunk Add-On	8086-40

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Additional Equipment Required to Perform the Exercises

Qty	Description	Model number
1	Personal Computer	8990-00 [1]

[1] Refer to the Computer Requirements in the System Specifications section of this datasheet if the computer is to be provided by the end-user.

Available Training Systems

Telephony Training System - Analog Telephone 8086-10

The Telephony Training System (TTS) - Analog Telephone is a powerful learning tool that provides training in modern telephone networks and digital private automatic branch exchanges (PABX).

It is also an essential tool to introduce students to the Integrated Services Digital Network (ISDN). The TTS is built upon state-of-the-art, programmable equipment that operates real world devices, including telephone sets and trunk lines.

The TTS courseware covers the following fields of telephony: analog access to the telephone network, central office operation, digital PABX, PABX analog trunk, and digital trunk. Furthermore, while performing the courseware material for the digital PABX or the digital trunk, students are introduced to the following two major aspects of ISDN: the physical layer (layer 1) and the network layer (layer 3).

The cornerstone of the TTS is the Reconfigurable Training Module, Model 9431. This module, which uses state-of-the-art digital signal processor (DSP) technology, can be programmed to act as different parts of a telephone network, such as a digital central office (CO) of the public switched telephone network (PSTN) or a digital PABX. Analog and digital interface cards, which the students install in the training module, allow connection of real analog and digital telephone sets and trunk lines. For example, a central office can be easily implemented by inserting an analog line interface card into a training module programmed to act as a central office. Similarly, a simple telephone network can be set up by inserting analog line and digital trunk interface cards into two training modules programmed to act as central offices, and by interconnecting the two modules via a trunk line.

A Pentium-type host computer is connected to the training module through a high-speed data link (Ethernet link with TCP/IP protocol). The host computer is used to configure the training module as a digital CO or a digital PABX, using the included Lab-Volt Telephony Training System (LVTTS) software. This Windows®-based software has an intuitive user interface that displays the functional block diagram of the telephony equipment (line interface, central office, digital PABX, etc.) implemented in the training module.

The LVTTS software allows students to perform step-by-step observation of call routing sequences, and to observe real signals throughout the system in both the time and frequency domains using virtual equipment. A powerful data-logging instrument in the LVTTS software allows recording of all ISDN layer-3 messages that are exchanged between ISDN entities (call processor in a CO or PABX, digital telephone sets) during telephone calls. This enables students to achieve thorough investigation of the ISDN signaling protocol.

The LVTTS software also allows various system parameters, such as the companding type, the number of voice channels, the telephone ringing cadence, and the call progress tone frequencies and modulation intervals, to be easily changed to comply with the standards of a particular country or application. For troubleshooting purposes, the software also allows faults to be inserted in the system, using a password-protected function.

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List of Equipment

Qty	Description	Model number
1	Power Supply	9408-00
1	Reconfigurable Training Module (RTM)	9431-10
1	Dual Analog Line Interface	9475-00
1	Software and Accessories	9482-00
2	Analog Telephone Set	9485-00

List of Manuals

Description	Manual number
Analog Access to the Telephone Network (Student Manual)	32964-00
Analog Access to the Telephone Network (Instructor Guide)	32964-10
Telephony Training System (User Guide)	32964-E0
Central Office Operation (Student Manual)	33646-00
Central Office Operation (Instructor Guide)	33646-10

Table of Contents of the Manual(s)

Analog Access to the Telephone Network (Student Manual) (32964-00)

- 1-0 The Telephone Set
- 1-1 Telephone Ringing
- 1-2 The Telephone Switchhook and Handset
- 1-3 Tone Dialing
- 1-4 Pulse Dialing
- 2-0 The Line Interface
- 2-1 Battery Feed Power Supply
- 2-2 Hybrid Function
- 2-3 Pulse Code Modulation
- 2-4 Companding
- 2-5 Time-Division Multiplexing
- 2-6 Subscriber Signaling

Central Office Operation (Student Manual) (33646-00)

- 1-0 Signaling Circuit
- 1-1 Hook Status Demultiplexing and Storage
- 1-2 Dialed Number Detection
- 1-3 Call Progress Tone and Ringing Generation
- 2-0 Digital Switching
- 2-1 Time-Division Switching
- 2-2 Space-Division Switching
- 2-3 Two-Dimensional Switching
- 3-0 System Control
- 3-1 Call Processor Functions
- 3-2 Intra-Exchange Call Routing Sequence
- 3-3 Central Office Configuration
- 4-0 Supplementary Services
- 4-1 Caller Identification

System Specifications

Parameter	Value
Power Requirement	
Current	3.5 A
Central Office (CO)	
Switching Type	Time-Space-Time (TST), digital
Switching Voice Channels	Selectable, 24 (1.544 Mb/s) and 30 (2.048 Mb/s)
Dialing Modes	Dual-Tone Multi-Frequency (DTMF), pulse
Calling Party Identification	Multiple Data Message Format (MDMF) Bellcore Caller ID
Private Automatic Branch Exchange (PABX)	
Switching Type	Time-Space-Time (TST), digital
Switching Voice Channels	30 (2.048 Mb/s)
Signaling Protocol	Basic National ISDN 1
Physical Characteristics	
Intended Location	On a table able to support the weight of the equipment
Dimensions (H x W x D)	215 x 750 x 600 mm (8.4 x 29.5 x 23.6 in)
Net Weight	TBE

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Telephony Training System - Digital Telephone Add-On 8086-20

The Telephony Training System - Digital Telephone Add-On is a PABX add-on to the Telephony Training System, Model 8086-1. It adds a digital telephone, as well as the required interface, to the training system.

List of Equipment

Qty	Description	Model number
1	Digital Telephone Interface	9476-00
2	Digital Telephone Set	9486-00

List of Manuals

Description	Manual number
Private Automatic Branch Exchange (PABX) (Student Manual)	33647-00
Private Automatic Branch Exchange (PABX) (Instructor Guide)	33647-10

Table of Contents of the Manual(s)

Private Automatic Branch Exchange (PABX) (Student Manual) (33647-00)

- 1-0 Architecture and Basic Operation
- 1-1 Architecture of a Digital PABX
- 1-2 Telephone Set Portability
- 1-3 Internal Call Establishment Procedure
- 1-4 Call Progress Indication
- 2-0 Call Functions
- 2-1 Call Holding and Multiple Call Control
- 2-2 Call Transfer
- 2-3 Conference Calling
- 2-4 Intercom

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System Specifications

Parameter	Value
Physical Characteristics	
Intended Location	The Digital Telephone Interface is designed to be installed in the Reconfigurable Training Module of Model 8086-1, while the Digital Telephone Set can be installed just like a standard telephone.
Dimensions (H x W x D)	90 x 700 x 230 mm (3.5 x 27.6 x 9.1 in)
Net Weight	TBE

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Telephony Training System - Analog Trunk Add-On 8086-30

The Telephony Training System - Analog Trunk Add-On is a PABX add-on to the Telephony Training System, Model 8086-1. It consists of a PABX Analog Trunk Interface that can be installed in the Reconfigurable Training Module.

List of Equipment

Qty	Description	Model number
1	PABX Analog Trunk Interface	9477-00

List of Manuals

Description	Manual number
PABX Analog Trunk (Student Manual)	35611-00
PABX Analog Trunk (Instructor Guide)	35611-10

Table of Contents of the Manual(s)

PABX Analog Trunk (Student Manual) (35611-00)

- 1-0 PABX Analog Trunk
- 1-1 Familiarization with the PABX Analog Trunk
- 1-2 Analog Trunk Interface
- 2-0 Call Routing Over a PABX Analog Trunk
- 2-1 External Call Answering and Termination
- 2-2 External Call Establishment (Overlap Sending Method)
- 2-3 External Call Establishment (En-Bloc Sending Method)
- 3-0 PABX Configuration
- 3-1 Configuring the PABX

System Specifications

Parameter	Value
Physical Characteristics	
Intended Location	The PABX Analog Trunk Interface is designed to be installed in the Reconfigurable Training Module of Model 8086-1.
Dimensions (H x W x D)	TBE
Net Weight	TBE

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Telephony Training System - Digital Trunk Add-On 8086-40

The Telephony Training System - Digital Trunk Add-On is an add-on to the Telephony Training System, Model 8086-1. It consists of a Digital Trunk Interface that can be installed in the Reconfigurable Training Module.

List of Equipment

Qty	Description	Model number
1	Digital Trunk Interface	9478-00

List of Manuals

Description	Manual number
Digital Trunk (Student Manual)	35815-00
Digital Trunk (Instructor Guide)	35815-10

Table of Contents of the Manual(s)

Digital Trunk (Student Manual) (35815-00)

- 1 Multiplexing Format and Basic Operation
- 1-1 Familiarization with the Digital Trunk
- 1-2 Digital Trunk Interface
- 1-3 Alarm Indication
- 2 Inter-Exchange Signaling
- 2-1 Outgoing Inter-Exchange Call Routing Sequence
- 2-2 Incoming Inter-Exchange Call Routing Sequence
- 2-3 Multiple Inter-Exchange Call Control

System Specifications

Parameter	Value
Physical Characteristics	
Intended Location	The Digital Trunk Interface is designed to be installed in the Reconfigurable Training Module of Model 8086-1.
Dimensions (H x W x D)	TBE
Net Weight	TBE

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Equipment Description

Power Supply
9408-00

The Power Supply is used to power electrical equipment in various radar and communications training systems. A flexible, five-wire power cord, terminated with a five-prong, twist-lock plug and line cap, supplies power to the module. A mechanical interlock on the line cap prevents the removal of an energized Power Supply from its locked position in the workstation. The Power Supply requires a three-phase, wye-connected, five-wire service installation. An appropriate wall outlet is supplied with each Power Supply so that the local ac power network can be properly terminated to receive the power cord. In addition to the three-phase legs and the neutral, a separate copper ground provides proper grounding for the Power Supply chassis and workstation cabinets, thus ensuring added safety for students using the equipment.

The Power Supply consists of fixed and variable dc and ac voltage sources, all terminated with 4 mm safety banana jacks. These sources can be used simultaneously, up to a total load current equal to the rating of the fixed three-phase output. Independent circuit breakers, reset from the front panel, protect the Power Supply input and outputs. Indicator lamps monitor the presence of input voltage in each phase. When a phase leg of the local ac power network is out, the lamp goes off to reflect this condition. A voltmeter, connected through a selector switch, monitors the outputs.

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Specifications

Parameter	Value
Power Requirement	
Current	3.5 A
Service Installation	Standard single-phase ac outlet
Rating of DC Power Outputs (2)	
+5 V	8 A / output
+3.3 V	7 A / output
+12 V - A	5 A / output
+12 V - B	3 A / output
-12 V	0.75 A (both outputs)
-5 V	0.5 A (both outputs)
AC Power Outlet Rating	120 V, 0.3 A, 50/60 Hz
Physical Characteristics	
Dimensions (H x W x D)	165 x 250 x 250 mm (6.5 x 9.8 x 9.8 in)
Net Weight	5.6 kg (12.2 lb)

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Reconfigurable Training Module (RTM) 9431-10

The Reconfigurable Training Module (RTM) consists mainly of a powerful digital signal processor (DSP), with three slots on the module front panel for installing interface modules. An Ethernet port (RJ-45) connector, located on the back panel, allows connection of the RTM to the host computer. The functionality of the training system is determined by downloading a program into the DSP memory using the host computer that runs the software. Electrical power is supplied to the RTM by the Power Supply, Model 9408, through a multipin cable that connects to the back panel.

Specifications

Parameter	Value
Interface Card Slots	
Analog/Digital	2
Digital	1
Analog Inputs (4)	
Voltage Range	±10 V
Impedance	600 Ω
Analog Outputs (4)	
Voltage Range	± 10 V
Impedance	600 Ω
A and B Auxiliary Outputs	
Voltage Range	± 10 V
Impedance	600 Ω
C and D Auxiliary Outputs	
Voltage Range	± 3.0 V
Impedance	8 Ω
Data Link to Host Computer	10 Mb/s (Ethernet) or 100 Mb/s (Fast Ethernet), TCP/IP Protocol
Physical Characteristics	
Dimensions (H x W x D)	205 x 430 x 280 mm (8.1 x 16.9 x 11.0 in)
Net Weight	9.8 kg (21.6 lb)

Dual Analog Line Interface 9475-00

The Dual Analog Line Interface is a compact module (also referred to as a card) designed to be installed into one of the three slots on a Reconfigurable Training Module that has been programmed to act as a digital CO. It contains two standard line interfaces providing conventional telephone sets (Model 9485) with an analog access to the CO implemented with the Reconfigurable Training Module. Two standard (RJ-11) telephone line connectors mounted on the front panel allow connection of analog telephone sets or PABX analog trunk lines to the Dual Analog Line Interface. Test points are also available on the front panel to observe the signals on each analog line using conventional test equipment. DC power is automatically supplied to the Dual Analog Line Interface when it is installed into a Reconfigurable Training Module.

Specifications

Parameter	Value
Voice Digitization	
Sampling Rate	8 kHz
Companding/Expanding	Selectable, None, μ-Law (255), and A-Law (87.6)
Resolution	8 bits
Bandwidth	3.4 kHz
Ring Generator	
Maximum Load	4 REN @ 86 V
Output Voltage	Selectable, 45 V, 75 V, and 86 V
Frequency	Selectable, 16.7 Hz, 20 Hz, 25 Hz, and 50 Hz
Interface A Line Resistance	Selectable, 600 Ω, 625 Ω, 650 Ω, 675 Ω, 875 Ω, 900 Ω, 950 Ω, 1.0 kΩ, 1.5 kΩ, 1.7 kΩ, 1.8 kΩ, 2.0 kΩ, 6.7 kΩ, 10 kΩ, and 20 kΩ
Interface B Line Resistance	600 Ω
Physical Characteristics	
Dimensions (H x W x D)	114 x 110 x 209 mm (4.5 x 4.3 x 8.2 in)
Net Weight	0.6 kg (1.4 lb)

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Digital Telephone Interface 9476-00

The Digital Telephone Interface is a compact module (also referred to as a card) designed to be installed into one of the three slots on a Reconfigurable Training Module that has been programmed to act as a digital PABX. It can interface four digital telephone sets (Model 9486) with the PABX implemented with the Reconfigurable Training Module. Four RJ-45 connectors mounted on the front panel allow connection of up to four digital telephone sets to the Digital Telephone Interface. Test points are also available on the front panel to observe the digital signals exchanged by a digital telephone set and the PABX. DC power is automatically supplied to the Digital Telephone Interface when it is installed into a Reconfigurable Training Module.

Specifications

Parameter	Value
Digital Phones Supported	4
Type	ISDN-BRI (2)
Physical Characteristics	
Dimensions (H x W x D)	114 x 110 x 209 mm (4.5 x 4.3 x 8.2 in)
Net Weight	0.6 kg (1.3 lb)

PABX Analog Trunk Interface 9477-00

The PABX Analog Trunk Interface is a compact module (also referred to as a card) designed to be installed into one of the three slots on a Reconfigurable Training Module that has been programmed to act as a digital PABX. It contains the electronic circuitry required to connect the PABX implemented with the Reconfigurable Training Module to a CO implemented with another Reconfigurable Training Module, through an analog trunk line. A standard (RJ-11) telephone line connector mounted on the front panel allows connection to the analog trunk line (included with the module). Test points are also available on the front panel to observe the signals on the PABX analog trunk line. DC power is automatically supplied to the PABX Analog Trunk Interface when it is installed into a Reconfigurable Training Module.

Specifications

Parameter	Value
Trunk Lines Supported	1 (full duplex)
Number of Voice Channels	1
Physical Characteristics	
Dimensions (H x W x D)	114 x 110 x 209 mm (4.5 x 4.3 x 8.2 in)
Net Weight	0.5 kg (1.2 lb)

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Digital Trunk Interface 9478-00

The Digital Trunk Interface is a compact module (also referred to as a card) designed to be installed into one of the three slots on a Reconfigurable Training Module that has been programmed to act as a digital CO. It allows connection of the CO implemented with the Reconfigurable Training Module to a CO implemented with another Reconfigurable Training Module, via a digital trunk line (included with the module) operating at the DS1 or E1 time-division multiplexing format. An RJ-48 connector mounted on the front panel allows connection to the digital trunk line. Test points are also available on the front panel to observe the digital signals exchanged through the digital trunk line. DC power is automatically supplied to the Digital Trunk Interface when it is installed into a Reconfigurable Training Module.

Specifications

Parameter	Value
Trunk Lines Supported	1 (full duplex)
Number of Voice Channels	Selectable, 24 (1.544 Mb/s) and 30 (2.048 Mb/s)
Time-Division Multiplexing Format	Selectable, DS1 (24 voice channels) and E1 (30 voice channels)
Physical Characteristics	
Dimensions (H x W x D)	114 x 110 x 209 mm (4.5 x 4.3 x 8.2 in)
Net Weight	0.5 kg (1.2 lb)

Software and Accessories
9482-00

The Software and Accessories set contains the software, as well as all cables and accessories, required for system operation. It mainly consists of the LVTTS software, interconnection cables, an Ethernet adapter (network card) to be installed in the host computer (if none is available), and a pair of speakers.

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Analog Telephone Set
9485-00

The Analog Telephone Set is a conventional telephone unit with the following additional features: speaker phone, LCD display, caller identification function, multiple phone number memory, and one-touch call buttons. A switch allows selection between tone dialing and pulse dialing. The telephone ringer can be turned off through another switch. The unit requires AC power (available on the Power Supply, Model 9408) for the LCD display, caller identification function, and memory to be operative. The Analog Telephone Set is provided with an RJ-11 connector cable that allows connection to a Dual Analog Line Interface, Model 9475.

Specifications

Parameter	Value
Power Supply	-48 V dc (from telephone line)
Auxiliary Power Supply	6 V dc, 50 mA (from ac powered adaptor)
Calling Party Identification	Bellcore Caller ID
Ringer Equivalence Number (REN)	0.7 B
Physical Characteristics	
Dimensions (H x W x D)	90 x 170 x 250 mm (3.5 x 6.7 x 9.8 in)
Net Weight	1.1 kg (2.4 lb)

Digital Telephone Set 9486-00

The Digital Telephone Set is a voice-only ISDN-type telephone provided with the following features: basic ISDN functions, programmable call appearance/function buttons, tiltable LCD display, and semi-duplex speaker.

Specifications

Parameter	Value
Power Supply	-48 V dc (from telephone line)
Protocols	National ISDN 1 and 2
Physical Characteristics	
Dimensions (H x W x D)	90 x 300 x 230 mm (3.5 x 11.8 x 9.1 in)
Net Weight	1.2 kg (2.6 lb)

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Optional Equipment Description

Personal Computer (Optional)
8990-00

The Personal Computer consists of a desk top computer with USB 2.0 ports, running under Windows® 7. A 50.8 cm (20 in) monitor, keyboard, and mouse are included.

Specifications

Parameter	Value
Power Requirements	
Current	2 A
Service Installation	Standard single-phase ac outlet

Reflecting the commitment of Festo Didactic to high quality standards in product, design, development, production, installation, and service, our manufacturing and distribution facility has received the ISO 9001 certification.

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